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Madam Chairman and Members of the Subcommittee, thank you for the opportunity to join in this discussion of the issues raised by the catastrophic 2007 southern California wildfires.

The fire community, including USGS, conducts fire-related research to meet the varied needs of the land management community and to understand the role of fire on the landscape; this research includes fire management support, studies of post-fire effects, and a wide range of studies on fire history and ecology. The U.S. Department of Agriculture (USDA) and the Department of the Interior (DOI) are active participants in the National Fire Plan, which is a long-term effort focused on helping to protect communities and natural resources. Part of this program includes the DOI and USDA Joint Fire Science Program, authorized and funded by Congress in 1997 to develop information and tools for managers dealing with wildland fires. My testimony today synthesizes work done by the fire science community, including the U.S. Forest Service, the USGS, and academia, over several decades.

Southern California – Home to large, catastrophic wildfires

Large, fast-moving, high-intensity wildfires are a recurring phenomenon on southern California landscapes. Understanding their causes is a critical first step to any strategy aimed at reducing community vulnerability to these events.

These fires are not new to this landscape. There is a rich history of such events that is well documented in newspaper reports from the latter half of the 19th century. Indeed one of the largest, if not the largest, wildfire in California history occurred during the last week of September 1889 and burned much of Orange County and a significant part of northern San Diego County. This fire had very minor societal impacts. What has changed today is not the size or intensity of fires but rather the size and distribution of the human population in the region.

At the outset, it is critical to understand that these are not forest fires. The little forest that exists in southern California is limited to higher elevations, some canyons and urban areas. It is estimated that no more than 3 percent of the recent 2007 fires in the region occurred in forests [data from Geospatial Multi-Agency Coordination (GEOMAC), geomac.usgs.gov]. The remaining 97 percent occurred in lower elevation shrublands and urban areas, burning native shrublands such as chaparral and sage scrub, non-native grasslands and urban fuels (structures and landscaping).

This is important because fires and fire management impacts can be very different between western forests and California shrublands. The type of fire naturally sustained in some western ponderosa pine forests is a low-intensity fire that burns dead twigs and branches on the forest floor. In chaparral shrublands, fires are naturally high-intensity and consume the entire shrub canopies, leaving bare much of the landscape.

This distinction is very important in understanding how fire management practices have affected past fire activity and may impact current and future fire activity. Understanding the unique characteristics of shrubland wildfires is critical to making planning and management decisions that will minimize the impacts of wildfires on our urban and natural environments.

Historically in western forests, fire suppression excluded fire from forests and allowed unnaturally high levels of fuels to accumulate. As a consequence, in many (though by no means all) western forests, high-intensity fires that consume entire forests are a partial result of fire protection efforts during the past century.

In the past, it was argued that the same applied to California shrubland wildfires; however, both scientists and managers are rapidly approaching a consensus that these arguments do not apply as directly here in the southern half of California, west of the desert. Despite a policy of fire suppression, we have never been able to exclude fire and have barely kept pace with the ever-increasing number of human-caused fires that has paralleled population growth in the region (Keeley and others, 1999). The primary reason that fire exclusion has not been possible in California is the annual occurrence each autumn of periods of gale-force Santa Ana winds that produce extreme fire-weather conditions (Keeley, 2006).

In the past, agencies such as Cal Fire, the U.S. Forest Service, the Bureau of Indian Affairs, the Fish and Wildlife Service, the National Park Service, and the Bureau of Land Management have responded to catastrophic fire events by renewing efforts to modify wildland fuels that they believed responsible for carrying such fires. The most recent 2007 fires stand as the most convincing evidence that extensive fuel modification projects will not stop such fires. Estimates are that across southern California at least 75,000 acres burned through areas that previously burned in 2002 and 2003. Clearly, these 4-5 year old fuels were incapable of stopping the 2007 fires driven by the extreme Santa Ana winds. However, many of these treatments have demonstrated their effectiveness in improving the likelihood of successful community protection during these events (e.g., protecting Poppit Flat from the Esparanza Fire in 2006).

The 2007 fires could be a turning point for fire, fire management, and planning in southern California. Modifying fuels will not prevent these fires and was never intended to. However, fuel modification will reduce fire intensity within the fuel-modification area and may have benefits for fire fighters, who require defensible space in order to protect structures from advancing fire fronts and to extinguish fires ignited on structures by ember throw. Fuel modifications around homes are necessary; however, additional research could focus on outlining the most strategically important sites for such pre-fire fuel treatments in wildland areas.

The present vulnerability of homes at the wildland-urban interface can be reduced in the future by greater consideration of Santa Ana wind patterns and their potential for bringing fires into the urban environment. This and other considerations about where homes are located relative to wildland fuels have the potential to reduce property loss.

In the past, county, State and Federal agencies have all included fire prevention strategies in their arsenal of weapons against catastrophic wildfires. There are many opportunities for innovation in this area. In the past month, scientists, managers and citizens have offered suggestions for new approaches that should be studied in response to the 2007 wildfires.

A renewed focus on ignition sources is needed, particularly those sources that are known to be problematic under Santa Ana wind conditions. These sources tend to be ignited by equipment operating in or near brushy areas, car fires and cigarettes along freeways and downed or arcing powerlines.

Post-fire response to wildfires is an area where we have made substantial progress in recent years. It is now widely understood that the vast majority of the wildland landscapes burned in large fires do not require any intervention, and indeed, intervention sometimes results in counterproductive efforts. We know from detailed studies that these shrubland ecosystems are highly resilient to high-intensity wildfires, and recovery within a few decades is usually guaranteed if left alone (Keeley, 2006). Most of the plant species in these ecosystems have dormant seed banks that are fire dependent and lie dormant for up to a century or more until triggered to grow by wildfires. These post-fire species, many of which are only ever seen after fire, add immensely to the biodiversity of this region.

The key to successful post-fire management is to find those areas where there are human values at risk and good reason to believe the natural regeneration processes will not be sufficient to provide an acceptable level of protection. California was a leader early in the 20th century in the use of artificial seeding of burned landscapes to stabilize slopes and reduce runoff. However, we now know that, when successful, such seeding operations can have negative impacts on native biodiversity. More importantly, seeding has proven to be ineffective at reducing erosion on our landscapes. California rainfall patterns are very unpredictable. Rather than experiencing the light steady autumn rains required to initiate seed growth so that root systems of grasses are established by the time of the intense winter rains, we often begin the rainy season with intense winter rains. As a result, seeds are washed off the slope along with the sediment. There are other management practices that are far more effective than seeding. One such practice is the use of physical barriers, such as hay mulch. The hay mulch serves as a barrier to rainfall and helps to stabilize the soil and prevent sedimentation. Hay bales placed at the bottom of the slope may contain sediments before they impact values at risk (Keeley and others, 2006).

A key resource concern following these extensive wildfires is how to reduce further burning of these landscapes for the one to two decades necessary for the native ecosystems to fully recover. Although the species that make up these systems are adapted to periodic fires, frequent fires have devastating impacts on their long-term survival. In this regard, serious attention should be given to the huge area of overlap in the areas burned in 2003 and 2007 (as determined from GEOMac), as it seems likely that the health of those landscapes is threatened with loss of native biodiversity and invasion by non-native species.

Improving Resilience to Multiple Hazards

Although the smoke from the wildfires has cleared, the danger is not over. Winter rains could trigger other hazards, such as flash floods and debris flows. My testimony to this point has focused on the factors that led to the recent firestorm. In addition, USGS is conducting research and developing public safety products addressing the consequences of the firestorm in three areas: the increased risk of flooding and debris flows, the impact on human health of possibly toxic ash, and the impact on ecosystems and endangered species.

In order to address flooding and debris flows, we are preparing maps in cooperation with FEMA and California state agencies that show debris-flow probability and identify the potential volume of material in the flows. These maps are scheduled for release in early December and will be used by Burned Area Emergency Response (BAER) Teams, the Governor's Office of Emergency Services, FEMA, the Bureau of Indian Affairs, U.S. Fish and Wildlife Service, the Bureau of Land Management, the National Park Service, and affected counties. These maps will also be used in a debris-flow warning system run cooperatively with the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS). We also are cooperating with NOAA to collect data in the coming winter through targeted instrumentation and data collection to improve our models and warnings in the future.

In order to understand potential health impacts from the ash, the USGS is sampling and evaluating the composition of ash and burn products from wildland and urban fires before the first runoff of the rainy season and during the first runoff.

In order to address the impact on ecosystems and endangered species, the USGS is developing an assessment for DOI partners to determine populations of species at risk from habitat loss. Biologists have been deployed to survey the burned areas that are the known locations of endangered species populations. This event provides a unique opportunity to better understand fire impacts on biodiversity with focus on species lost, ecosystem response, and the threat of invasive species. It also provides a unique opportunity to examine the significance of burn severity.

These efforts are part of a new USGS Multi-Hazards Demonstration Project in southern California to demonstrate how integrating information and products about multiple hazards, including wildfire, debris flows, floods, and earthquakes, improves the usefulness of this information in reducing the vulnerability of high-risk communities to natural hazards. Southern California was a natural choice given that the region has one of the Nation's highest potentials for extreme catastrophic losses due to natural hazards.

Interior has the ability to partner with relevant agencies to help the 20 million residents of southern California manage the risks ahead this winter and to study both the fire and its aftermath so as to better understand how to reduce the risks in the future. In addition to the current mitigation efforts to protect citizens from the fast-approaching winter rains, investigations are needed to understand the nature and the full extent of the threat from debris flows for the next few winters, until a sufficient plant cover is established on the hillsides. Effective hazard mitigation from the inevitable future wildfires and associated debris flows will only be possible if there is an in-depth understanding of the processes. The consequences of fires on our environment, including loss of habitat for endangered species and the introduction of toxic chemicals from the burn residue into ground water and soils, must be documented and analyzed to plan the recovery.

Conclusion

Scientists have been studying the natural processes discussed in my testimony in southern California for decades and thus have the baseline data from which we can understand the changes brought about by the fires. We have the scientific expertise in wildland fire research to help in understanding the ecosystems affected by wildfire and to assist land managers in post-fire recovery and rehabilitation in southern California. In addition, USGS modeling of fire behavior can help improve the placement of homes relative to wind patterns and fire behavior.

Madam Chairman, this concludes my remarks. I will be pleased to answer any questions you may have.

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